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# Stunting Cause Factors in the Village of Traditional Bali

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**Abstract**

In the province of Bali (2010) a decline in the prevalence of malnutrition and in Bangli still have malnutrition about 11.7%. Factors associated with the nutritional problem is the food intake, environment, behavior, low consumption of the food and the presence of infectious diseases. The study design was cross-sectional in Balinese traditional village with the same sample with a total population of 260 children under five. Analysis Hosmer and Lemeshow test showed the value of p = 0.854 (p> 0.05) means that the data of independent variables that factor consumption and behavioral factors Fit conjunction with regression. Value Nagelkerke R Square of 0.096, which means that only 9.6% of stunting caused by the independent variable simultaneously and the remaining 90.4% were prescribed other factors. Logistic regression showed the results of protein consumption with Exp (B) = 0.45, p = 0.01, that low protein intake causes stunting incidence 2.2 times higher than those who consume enough protein. Different types of consumption with Exp (B) = 1.91, p = 0.04, that different types of low consumption causes stunting incidence of 1.91 times higher compared to different types of consumption are sufficient. Other independent variables showed no significant correlation. Protein consumption is lower than the recommended nutritional requirements, namely 80.0%. This situation needs serious attention from parents due to lack of protein consumption over a long period will cause the emergence of the problem of severe malnutrition or less malnutrition or the emergence of children under five stunting or wasting. Different types of consumption illustrate the number of types of food consumed during 24 hours compared to the standard. The incidence of stunting influenced consumption, especially consumption of proteins and different types of consumption, while the behavioral factors showed no significant effect on stunting.



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## 1. Introduction

Malnutrition in children under five remains one public health problem in Indonesia. In general, in 2007 the prevalence of severe malnutrition in Indonesia of 5.4% and 13.0% less malnutrition (MOH, 2008a). In 2010 the national decline in the prevalence of severe malnutrition of 0.5% to 4.9% and that less malnutrition is still 13.0%. The prevalence of severe malnutrition and less malnutrition in the province of Bali in 2007 was still below the national prevalence is 3.2% severe malnutrition and 8.2% less malnutrition (MOH, 2008b). In 2010 in the province of Bali decrease the prevalence of malnutrition to 1.7% and to 9.2% malnutrition. The prevalence of malnutrition in Bangli 2.0% and 9.7% malnutrition (MOH, 2010). In District Bangli decrease severe malnutrition is 0.21% (2009) to none in 2010 and 2011, as well as less malnutrition decline, is 4.96% (2009) to 4.10% (2010) and in 2011 dropping back to 2.6% (Bangli District Health Office, 2009; Bangli District Health Office, 2010b; The District Health Office Bangli, 2011). Factors associated with the nutritional problem is the food intake and use of food7), environment, behavior, health care, and descent8), low consumption of the food and the presence of infectious diseases (UNICEF, 1998). Research conducted in the Malaysian showed nutrition problems is influenced by three main factors, namely biological factors, environmental factors and behavioral factors (Cheah *et al.,* 2010).

Risk factors for the low consumption of food are inadequate parenting and food consumption patterns which do not meet the pattern of balanced nutrition. Inadequate parenting associated with low levels of education mothers so that they lack an understanding of food preparation for infants who meet their nutritional needs. Besides consumption patterns are influenced by the level of education, is also influenced by the availability of food in the village and family purchasing power. Poverty exacerbates family consumption patterns and access to health services. These conditions will have an impact on the emergence of chronic nutritional problems.

Pengotan village is a village in the North end of the Bangli District Area. The village is 16 km from the city of Bangli and 57 km from Denpasar. Village Location Pengotan quite strategically located on the main highway linking the city with the Kintamani Bangli and Buleleng. The total area of 980 ha Pengotan village, with a height of 800-1100 m asl (above sea level), cold climate with an average temperature of 28 ° C and rainfall of 6 months of the year. In the north bordering Kedisan (Kintamani), in the south and east by the Village Landih (Bangli), and in the west by the Village Sekaan (Kintamani). Pengotan village has a working area of 8 (eight) hamlet (Tiying Desa, Delod Desa, Dajan Desa, Sunting, Yoh, Besenga, Penyebeh, and Padpadan) and 1 (one) indigenous villages (Village Pengotan, 2010).

A population of 982 families (3673 persons), consisting of 1886 men and 1787 women. The education level of the village community Pengotan mostly elementary school as many as 2761 people and more junior, senior and there are graduated College.

Revenue Pengotan village communities come from agriculture, forestry, plantation, animal husbandry, trade, services, and others. In 2009 an estimated income of society as a whole amounted to IDR 7.066 billion, - (Seven Billion Sixty Six Million Rupiah) or IDR 1.900.000, - per capita per year or 160,000 Rupiah, - per capita per month, or about IDR 5300, - per capita per day. This situation will affect the family consumption pattern (Village Pengotan, 2011).

Pengotan village belonging to the village of Bali Age has a unique associated with the implementation of religious ceremonies. Manusa yadnya ceremony and dewa yadnya in this village held specifically to follow the rules agreed upon by the community. Among them is a ritual ceremony at the shrine of the family (sanggah / pemerajan), and temple in the village. There was also a religious ceremony is held on trust and family traditions include ceremonial nebusin / mebayuh and bajangan. Ceremony nebusin / mebayuh do in Pura Dalem for a pregnant woman during pregnancy before the 9 months with the aim of redeeming the baby to be born so that the baby is born much easier, safe and healthy. Bajangan ceremony performed for infants born not quite a month (premature) with the aim of improving the health of the baby will be fast. So Meekly indigenous communities against the deal so that people do not dare to abuse and implement them in according to ability (Muninjaya *et al.,* 2010).

Costs incurred for religious ceremonies per year is quite high while the vast majority (56%) people are still classified as poor households. The low educational level is a primary school (90.4%) and limited land ownership (50 m2-60,000 m2) resulted in low levels of family income (an average of IDR. 16,300/day). This affects food availability and consumption patterns at the family level, especially children under five (Muninjaya *et al.,* 2009). From the description above it is necessary to analyze the relationship of risk factors associated with the incidence of stunting include the strength of the relationship between consumption and behavior with the incidence of stunting.

## 2. Materials and Methods

This study design was a cross-sectional study of the relationship between the independent variables with the dependent, with the first requests one measurement simultaneously in one unit of time (Sastroasmoro & Ismael, 1995; Notoatmodjo, 1993). The study was conducted in the village of Pengotan, District Bangli, Bali Province, Indonesia. The sample was total population numbered 260 children under five.

The research variables are the consumption factor consists of the amount of energy consumption (FK1), the amount of protein consumption (FK2), number of meals a day (FK3), the composition of the dishes a day (FK4), different types of consumption (FK5) and behavioral factors consist of breastfeeding (FP1 ), giving Complementary foods (FP2), the age of weaning (FP3), food preparation (FP4), way of feeding (FP5), nutritional knowledge mother (FP6), history of pregnancy tests (FP7), a history of childbirth (FP8) and frequency to healthcare (FP9). To determine the variables that affect stunting used logistic regression analysis (Widarjono, 2010).

## 3. Results and Discussions

### *3.1 Result*

1) Nutritional Status Based on Height by Age

Table 1 showed the general subject of the study had normal nutritional status (52.3%). The research subjects with short nutritional status (26.1%) and very short (19.6%) spread out in all villages and the highest in the Tiying Desa. This situation needs attention from both parents and integrated health pos (Posyandu) cadres, especially health care workers.

Table 1
Distribution Research Subjects by Status Nutrition (height by age) and Hamlet

| Hamlet | Nutrition Status Height by Age | | | | Total |
|---|---|---|---|---|---|
| | High | Normal | Short | Very Short | |
| Delod Umah | 0 (0.0%) | 6 (2.3%) | 11 (4.2%) | 5 (1.9%) | 22 (8.5%) |
| Dajan Umah | 0 (0.0%) | 36(13.8%) | 8 (3.1%) | 8 (3.1%) | 52 (20.0%) |
| Tiying Desa | 1 (0.4%) | 16 (6.2%) | 16 (6.2%) | 11(4.2%) | 44 (16.9%) |
| Sunting | 0 (0.0%) | 15 (5.8%) | 5 (1.9%) | 4 (1.5%) | 24 (9.2%) |
| Yoh | 1 (0.4%) | 12 (4.6%) | 3 (1.1%) | 2 (0.8%) | 18 (6.9%) |
| Padpadan | 1 (0.4%) | 15 (5.7%) | 10 (3.8%) | 8 (3.1%) | 34 (13.1%) |
| Besenge | 1 (0.4%) | 16 (6.2%) | 7 (2.7%) | 7 (2.7%) | 31 (11.9%) |
| Penyebeh | 1 (0.4%) | 20 (7.7%) | 8 (3.1%) | 6 (2.3%) | 35 (13.5%) |
| Total | 5 (1.9%) | 136(52.3%) | 68(26..1%) | 51(19.6%) | 260(100,0%) |

2) Analysis by Independent Dependent Variables

Table 2
Hosmer and Lemeshow Tes

| Step | Chi-square | df | Sig. |
|---|---|---|---|
| 1 | 3.316 | 7 | .854 |

Based on the analysis Hosmer and Lemeshow test with p = 0.854 (p> 0.05) mean that the data of independent variables that factor consumption and behavioral Fit relationship with regression (Table 2).

Table 3
Results Analysis The Magnitude of Influence (Nagelkerke R Square)

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 340.890[a] | .072 | .096 |

Value Nagelkerke R Square of 0.096, which means that only 9.6% of stunting caused by the independent variable simultaneously and the remaining 90.4% were prescribed other factors (Table 3).

Table 4 showed the amount of protein consumption (FK2) with Exp (B) = 0.45, p = 0.01, which means the protein consumption of children under five low causing stunting incidence 2.2 times higher compared with children under five who consume enough protein.

Different types of consumption (FK5) with Exp (B) = 1.91, p = 0.04, which means that different types consumption of child under five is low causes stunting incidence of 1.91 times higher compared to different types of consumption are sufficient.

Other independent variables are the amount of energy consumption (FK1), number of meals a day (FK3), the composition of the dishes a day (FK4), breastfeeding (FP1), giving complementary foods (FP2), the age of weaning (FP3), food preparation (FP4 ), way of feeding (FP5), maternal nutrition knowledge (FP6), history of pregnancy tests (FP7), a history of childbirth (FP8) and frequency to health services (FP9) showed no significant effect.

Table 4.
Regression Analysis with entering Method

| | | B | S.E. | Wald | df | Sig. | Exp(B) | 95% C.I.for EXP(B) | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lower | Upper |
| Step 1[a] | FP1 | -.148 | .636 | .054 | 1 | .816 | .862 | .248 | 2.999 |
| | FP2 | 1.139 | 1.249 | .831 | 1 | .362 | 3.123 | .270 | 36.117 |
| | FP3 | .523 | .590 | .784 | 1 | .376 | 1.686 | .531 | 5.359 |
| | FP4 | -.040 | .744 | .003 | 1 | .957 | .960 | .223 | 4.130 |
| | FP5 | .256 | .293 | .762 | 1 | .383 | 1.291 | .728 | 2.291 |
| | FP7 | -.300 | .289 | 1.078 | 1 | .299 | .741 | .420 | 1.305 |
| | FP8 | 1.679 | 1.155 | 2.113 | 1 | .146 | 5.360 | .557 | 51.550 |
| | FP9 | -21.084 | 22892.789 | .000 | 1 | .999 | .000 | .000 | . |
| | FP10 | 21.342 | 40193.058 | .000 | 1 | 1.000 | 1.856E9 | .000 | . |
| | FK1 | .569 | .337 | 2.848 | 1 | .091 | 1.766 | .912 | 3.420 |
| | FK2 | -.788 | .332 | 5.630 | 1 | .018 | .455 | .237 | .872 |
| | FK3 | -.916 | .925 | .979 | 1 | .322 | .400 | .065 | 2.455 |
| | FK4 | -.164 | .339 | .233 | 1 | .629 | .849 | .437 | 1.650 |
| | FK5 | .646 | .325 | 3.950 | 1 | .047 | 1.908 | 1.009 | 3.608 |
| | Constant | -2.447 | 46255.384 | .000 | 1 | 1.000 | .087 | | |

*3.2 Discussion*

Based on the indicator height for age normal nutritional status as much as 52.3%, nutritional status as much as 26.1% of short and very short nutritional status of 19.6%. Research subjects who have the nutritional status of short and very short need more comprehensive treatment. Efforts need to be made include an increase in the consumption patterns of parenting and pregnant women so that the fetus grow and develop optimally. The mother gave birth without complications with enough birth weight infants. In later life period, mother must pay attention to parenting

and consumption patterns so that babies still have optimal nutritional status. Exclusive breastfeeding is maintained, giving supplementary feeding types and amounts are adjusted for the age of children under five.

Total consumption of protein (FK2) with Exp (B) = 0.45, p = 0.01, which means the protein consumption of children under low causing stunting incidence 2.2 times higher compared with children under five who consume enough protein.

One of the functions of proteins is growing and transporting nutrients throughout the body. Before the cells can synthesize new proteins, must be provided all the essential amino acids necessary and sufficient nitrogen or amino bond to the formation of nonessential amino acids are required. Growth is possible only when there is enough corresponding amino acid mixture. Besides, the protein also has a role in transporting the substances from the gastrointestinal tract through the wall of the gastrointestinal tract into the blood and from the blood to the tissues, and through cell membranes into cells. Lack of protein will cause interference with the absorption and transport of nutrients throughout the body (Almatsier, 2005).

Protein consumption is still low compared with the recommended dietary allowance (RDA) that is 80.0% below 100% KGA. This situation needs serious attention from parents due to lack of protein consumption over a long period will cause the emergence of the problem of malnutrition or the emergence of children under five stunting /wasting.

Call and Levinson (1973) statement that the nutritional status is affected by food intake and use of food. This statement supports the results of research on the relationship between nutritional status and the consumption of, especially proteins (Call & Levinson, 1973).

Consumption can be influenced by food availability at the household level, and behavior or parenting parents to children under five (UNICEF, 1998). (Anonymous, 1989). Ernawati study (2006) on children age 2-5 years in the district of Semarang, said the level of energy consumption, the level of protein intake and the incidence of acute respiratory infections associated with nutritional status, but the level of per capita income not related to the level of energy consumption and the level of protein consumption (Ernawati, 2006).

Research conducted in Ecuador stated that based on height for age indicators obtained prevalence of stunted children under five of 26%. Factors associated with the prevalence of stunting children under five is mother's education, housing conditions, access to health services, ethnicity, fertility, maternal age and composition of the diet (Carlos Larrea & Ichiro Kawachi, 2008).

Research Richard *et al.,* (2016) stated sixty-two percent of children stunting had serum concentrations lower than the nine essential amino acids (tryptophan, isoleucine, leucine, valine, methionine, threonine, histidine, phenylalanine, lysine) compared to children are not stunting. Research Putri Anindita (2012) showed a positive relationship between the level of adequacy of protein intake and starting in infants. Research Achenef *et al.,* (2015) showed the incidence of food insecurity as a determinant of wasting. Research Shinsugi *et al.,* (2015) reported severe food insecurity in families associated with the incidence of stunting in children under five.

Different types of consumption (FK5) with Exp (B) = 1.91, p = 0.04, which means that different types of children under five low consumption causes stunting incidence of 1.91 times higher compared to different types of consumption are sufficient. The results showed different types of consumption varies from 3 to 9 kinds of foodstuffs. This situation needs to be improved so that the provision of adequate nutrition from food sources that vary over securing the availability of nutritional substances.

Different types of consumption (BJK) describe the number of types of food consumed during 24 hours compared to the standard. BJK standards for each country varies and to Indonesia until now used 12 types. Different types of consumption can be categorized into four, namely: good (11-12), sufficient (8-10), moderate (5-7) and bad (3-4) (Roedjito, 1989). Theron *et al.,* (2007) suggest a diet with less good quality is not the main cause of occurrence of stunting.

Research Cheah *et al.,* (2010) suggested the nutrition problem is influenced by three factors: biological factors, environment, and behavior. This statement does not support the research especially nutritional status relationship to behavior.

## 4. Conclusion

The incidence of stunting influenced consumption especially consumption of proteins (FK2) and different types of consumption (FK5), while the energy consumption (FK1), number of meals a day (FK3), the composition of the dishes a day (FK4) does not affect. Behavioral factors include breastfeeding (FP1), giving complementary feeding

(FP2), the age of weaning (FP3), food preparation (FP4), way of feeding (FP5), nutritional knowledge mother (FP6), history of pregnancy tests (FP7), a history of childbirth (FP8) and frequency to health services (FP9) showed no significant effect on stunting.

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*Statement of authorship*

The author(s) have a responsibility for the conception and design of the study. The author(s) have approved the final article.

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